The Injectors

05 RHIC Retreat

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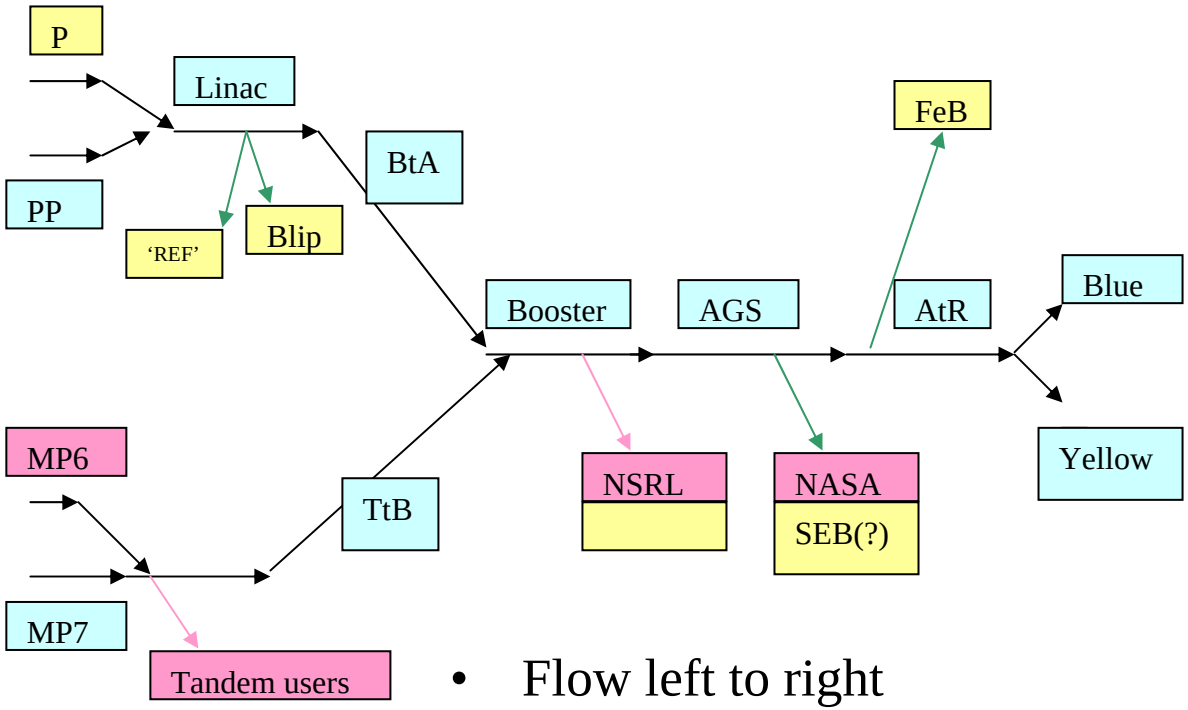
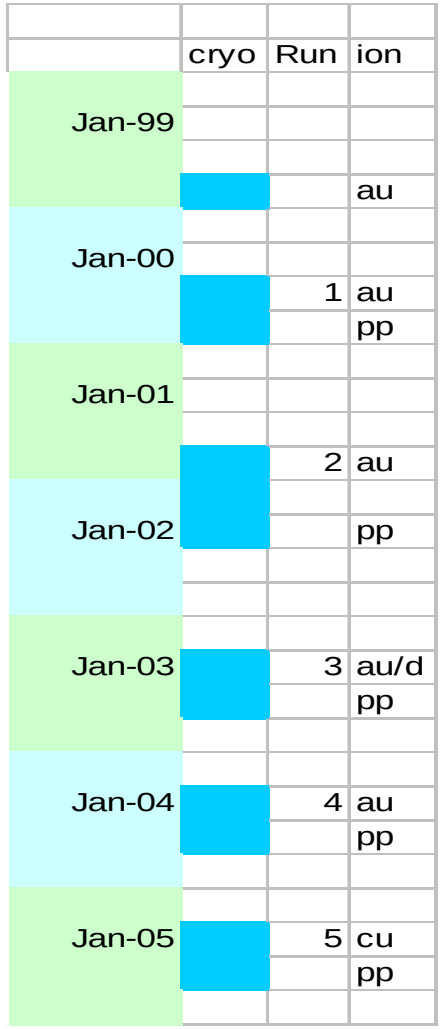
RHIC Beams (blue) and Other Injector Activities (yellow,pink)



- Flow left to right
- Historically prep work behind stores for RHIC next step
- And other users for upstream pieces

cartoon reminder of the history

H.I.=Gold
except this year,
Polarized protons
every run.



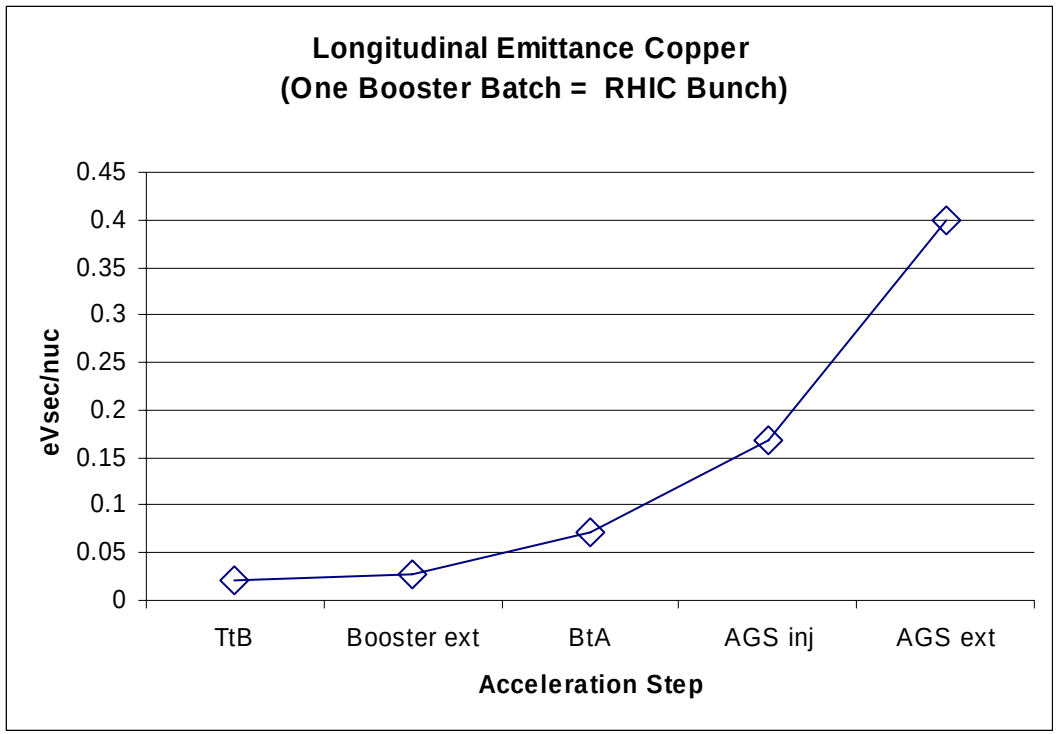
Run 5 : Cu

- A new ion to accelerate
- “Easy” relative to au: one less Tandem foil stripping ~x5, and BtA stripping 100% ~x2.
- But the a priori “bar” placement assumed all that, so challenging.

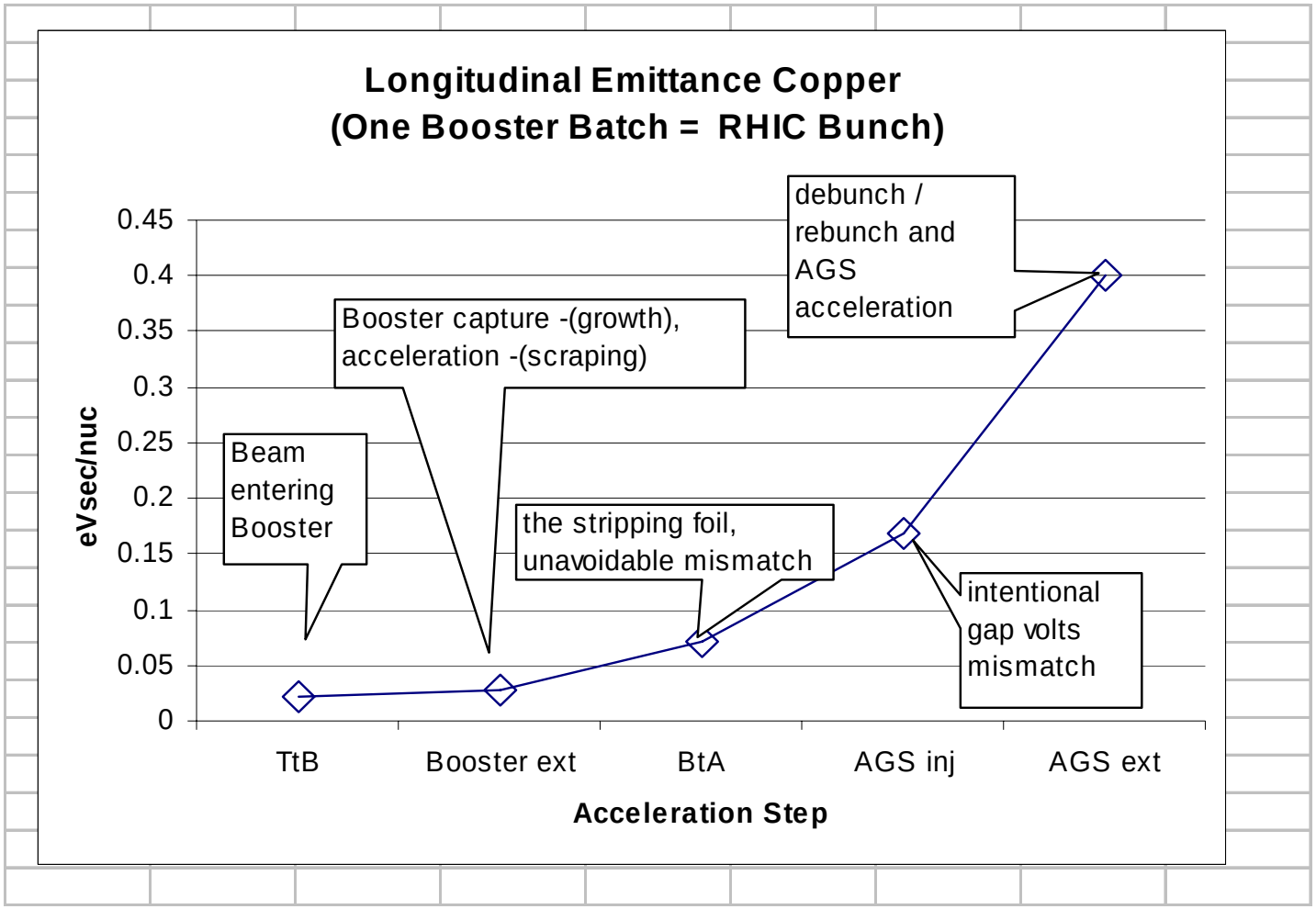
  Source delivered as promised

  Careful tuning at each step (longitudinal development pics)
- BtA stability not an issue (after some early ps work)

Copper - Longitudinal Emittance Development throughout the Acceleration Cycle (data from Kip Gardner, PAC05)



Longitudinal emittance development – with commentary



Last Booster batch into AGS– intentional mismatch

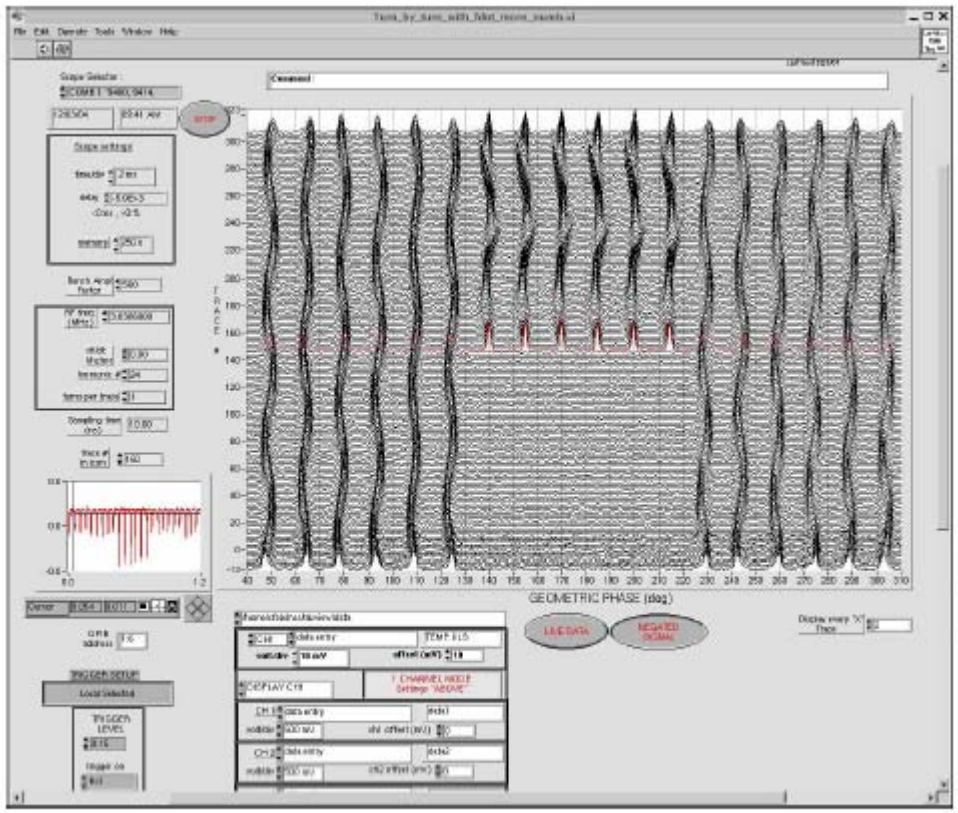
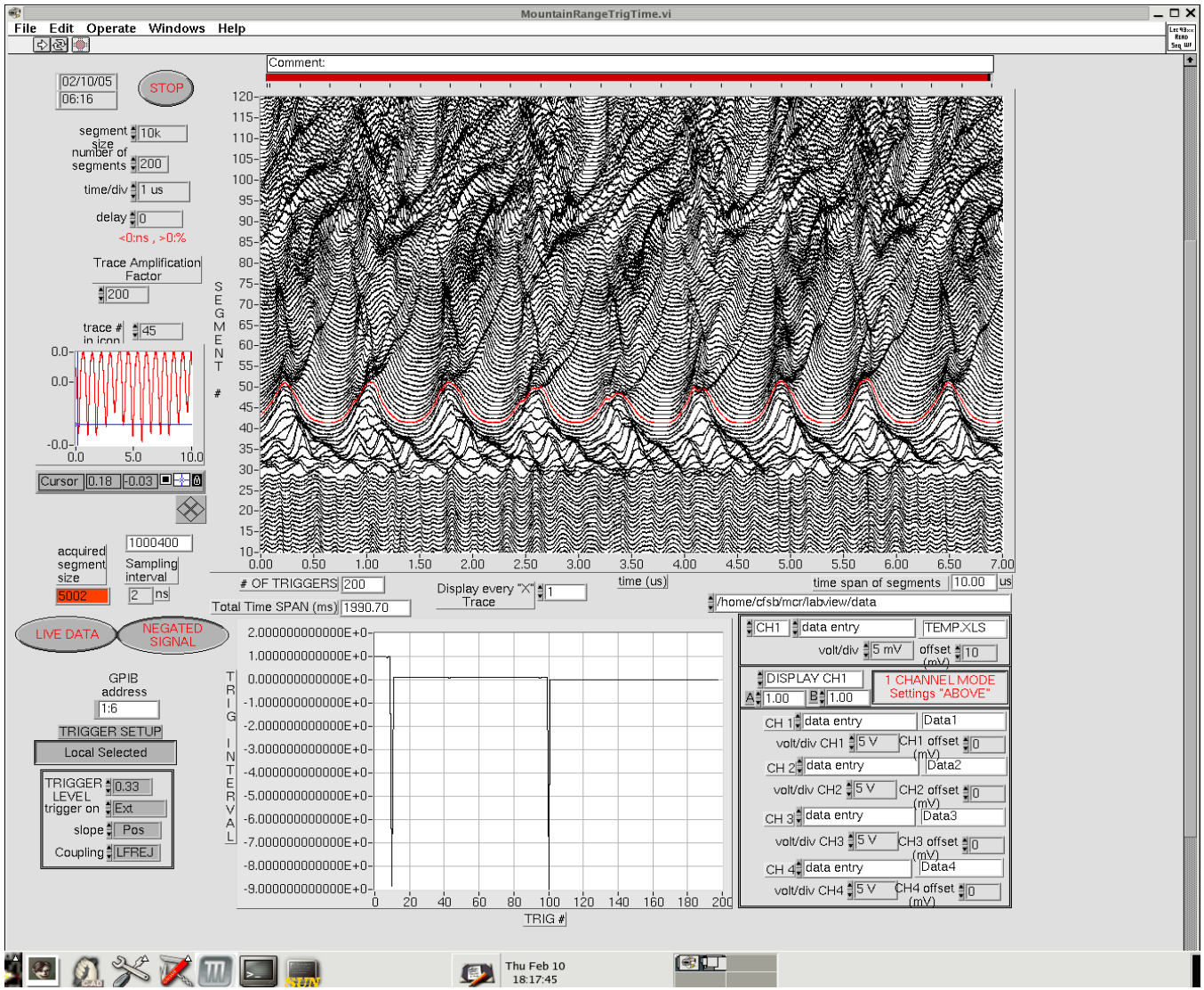


Figure 12: Last batch of six bunches injected into AGS.

Rebunch to 4 in h=12: new gear coming(?)



Run 5: Polarized Protons

- Injector setup the same as for Run 4.
- Source giving a little higher polarization, and more intensity, and longer intervals between maintenance.
- AGS ac dipole pulsing setup – more stable than we deserve. Vertical betatron tune reproducing to much better than .001 (typical resonance setting Qv = 8.6757.
- Other aspects of setup also stable enough (BtA …).
- Intensity dependence of polarization?

Next run : if Au

- Run4: >1e9/bunch routine, but development mature. Without new strategies intensity will not go up much.
- AGS debunch-rebunch: new gear but not next year.
- BtA foil development Beryllium .005 -> .006(better) ->.007 ? SiO2 less dE but less intensity relative to C.
- Booster merge (Brennan, development behind Run4, pic) actually delivered 1.7e9 into RHIC. However if we want to go this way, need 1) significant rf development (new machinery in Booster) and 2) work on Booster magnetic cycles – need 9 Booster cycles/ AGS cycle. Grid issue.

Booster Merge - behind Run 4 (Brennan EPAC04)

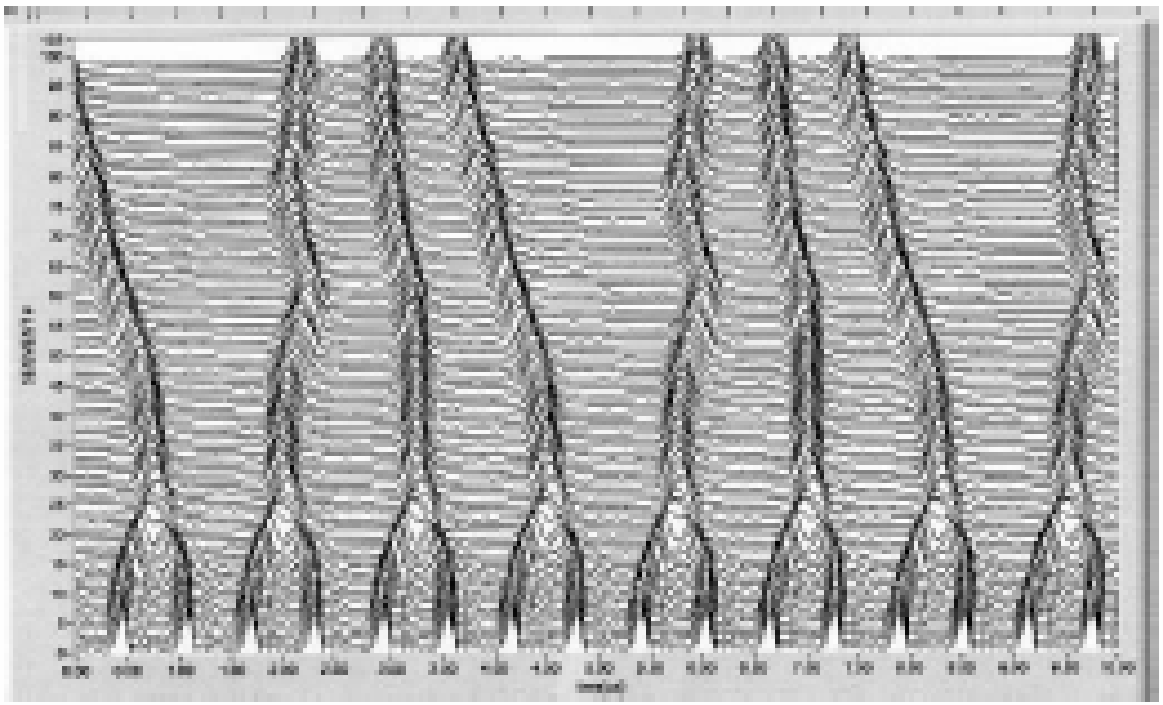


Figure 4. Mountain range of bunch merge and harmonic change in the Booster. Two & 2/3 turns are shown and the total time is 50 ms. Three bunches go to the AGS 8 times.

Next Run Polarized Protons

- Haixin will talk on the Cold Snake development work, which is exciting and challenging!
- Pushing the injectors “modeling” capabilities. Modeling (what is in the AGS?), organization, communication (that’s not what you asked for!). A tough space, with a nice test at the end.

comments

- We can get away with much lower reliability from the injector pieces if we are only occasionally filling RHIC – especially since usually RHIC can hold its store until the injectors are ready. Although this is true enough, we should still be counting the failures if we want to rationally spread the resources. The cold snake development was severely slowed down by failures (Linac, Booster injection, BtA quads) which were not “counted” since they did not impact the RHIC program. Maybe another category?